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**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Paper No. 22

Application Number: 09/046,121
Filing Date: March 20, 1998
Appellant(s): HALL ET AL.

Kevin P. Radigan
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed 1/23/03.

### *(1) Real Party in Interest*

A statement identifying the real party in interest is contained in the brief.

***(2) Related Appeals and Interferences***

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

***(3) Status of Claims***

The statement of the status of the claims contained in the brief is correct.

***(4) Status of Amendments After Final***

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

***(5) Summary of Invention***

The summary of invention contained in the brief is correct.

***(6) Issues***

The appellant's statement of the issues in the brief is correct.

***(7) Grouping of Claims***

Appellant's brief includes a statement that claims 1-5, 7, 9, 12, 13, 15-18, 20-26, 28 and 31-38 do not stand or fall together and provides reasons as set forth in 37 CFR 1.192(c)(7) and (c)(8).

Appellants submit the following groups of claims:

Group I: Claims 17, 23, 31, 38;

Group II: Claims 1, 2, 9, 21, 24, 25 & 37;

Group III: Claims 3-5 & 26;

Group IV: Claims 7 & 28; and

Group V: Claims 12, 13, 15, 16, 18, 20, 22 & 32-36.

***(8) Claims Appealed***

The copy of the appealed claims contained in the Appendix to the brief is correct.

***(9) Prior Art of Record***

| | | |
|---|---|---|
| 5,682,204 | UZ ET AL. | 10-1997 |
| 5,148,498 | RESNIKOFF ET AL. | 9-1992 |

***(10) Grounds of Rejection***

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 7, 9, 12, 13, 15-18, 20-26, 28 and 31-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uz (5,682,204) in view of Resnikoff (5,148,498).

Regarding claim 1, Uz discloses a method for encoding a frame, comprising:

using intra-frame statistics to determine without reference to another frame whether said frame includes a random noise portion and a normal video portion (col.3, lines 25-27 and also see col.9; note intra-frame encoding is used and note Uz discloses "significant detail" is determined in a video frame, thus statistics are gathered from the intra-frame encoding process; also, the frame has the normal video portion along with

the portion with significant detail, ie. random noise portion; col.16, lines 1-37, Uz discloses that actual pictures or normal video portion contains distortion or random noise), and if so, then for each macroblock of said frame:

(I) determining a macroblock activity level (col.8, lines 27-35; an activity level is measured which is the same as the determination of an activity level);

(ii) determining when said macroblock activity level exceeds a predefined threshold (see figure 3; note that a threshold is set and a determination means must exist to determine when the activity threshold is passed so that a course of action will be taken due to the determination of whether the macroblock activity level exceeds a predefined threshold), wherein said macroblock activity level exceeding said predefined threshold indicates that said macroblock is associated with said random noise portion of said frame; and

(iii) adjusting encoding of said macroblock when said macroblock activity level exceeds said predefined threshold to conserve bits used in encoding said macroblock (see figure 3; note that if a threshold is exceeded, then intercoding is used which thereby reduces the bit-rate and conserve bits used in encoding said macroblock) by biasing coding of said macroblock associated with said noisy portion of said frame towards predictive coding (col.9, lines 4-12, lines 36-43; please note that Uz does teach the biased coding of macroblocks towards "inter-coding" or predictive coding, thus this "bias" is used to encode macroblocks towards predictive coding) and thereby save bits otherwise used to encode said random noise portion of said frame and provide a more constant picture quality due to encoding of the frame.

Although Uz does not specifically disclose the limitation of "determining whether said frame includes a noisy portion, and if so, then for each macroblock of said frame" and the preservation of more bits for the less noisy area (ie. normal video portion) of an image at the expense of the highly complex image area (ie. random noise portion) of the frame, Resnikoff teaches the determination of noise in frames (see figs. 2-3; in col.10, lines 3-20, Resnikoff discloses that the input image is subjected to the image transformer and note in fig.3, the original input image 72 is generated into four arrays of coefficients 74-77 where 74 is the LL set, the lower frequency information that is more important to human viewing or the normal video portion, and elements 75-77 (LH, HL and HH set of coefficients), the less important video information or the random noise portions elements 75-77, are allocated by zero bits, thus preserving more bits for the LL set element 74 or the normal video portion; clearly, the noisy portion of a frame is determined and that frames are comprised of macroblocks). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Uz and Resnikoff for noise reduction and adaptive encoding so as to provide accurate, efficient encoding schemes for producing high quality images.

Note claims 2, 3, 17, 24, 25, 31, 37 and 38 have similar corresponding elements.

As for claims 7 and 28, Uz discloses motion estimation process done on said macroblock (col.11, lines 20-26).

Regarding claims 9, 22-23 and 35-36, Uz discloses the determination of adjusted quantization level for use in encoding a macroblock (col.12, lines 50-53).

Regarding claims 4, 18 and 32, Uz discloses the comparison of "total activity of a

frame macroblock" (col.5, lines 62-63). However, Uz fails to disclose the comparison of a minimum activity level of said order with a next to minimum activity level of said order to derive said activity level for said macroblock as disclosed by the applicant. Therefore, it would have been obvious to one of ordinary skill in the art to compare the minimum activity level of said order with a next to minimum activity level of said order to derive said activity level for said macroblock for encoding accuracy and efficiency.

Regarding claim 5, Uz does disclose the calculation of average activity (col.11, lines 12-13) in frame macroblocks. However, Uz fails to teach the comparison of a minimum activity level with an average activity level in said multiple blocks of said macroblock. Therefore, one of ordinary skill in the art would obviously do a comparison of a minimum activity level with an average activity level in said multiple blocks of said macroblock for improving encoding accuracy and efficiency.

As for claims 12 and 13, Uz discloses a measure of a frame complexity value (col.12, lines 60-64). However, Uz fails to teach the calculation of a complexity threshold and the comparison of said frame complexity value. Therefore, it would have been obvious to one of ordinary skill in the art to calculate a complexity threshold from a group of frames, since an activity threshold can be calculated, and a comparison of complexity values is obvious to do from a group of complexity values for improving encoding accuracy and speed.

As for claims 15, 16, 20 and 33, one of ordinary skilled in the art would obviously recognize that all digital devices require the flagging of ones and zeroes since digital logic dictates the well known use of a binary system in digital communications.

Regarding claim 26, Uz does teach the determination of an activity level (col.8, lines 27-35; the measure of an activity level is the determination of an activity level). However, Uz fails to disclose the comparison of a minimum activity level of said order with a next to minimum activity level of said order to derive said activity level for said macroblock as disclosed by the applicant. Therefore, it would have been obvious to one of ordinary skill in the art to compare the minimum activity level of said order with a next to minimum activity level of said order to derive said activity level for said macroblock for encoding accuracy and efficiency.

Note claims 21 and 34 have similar corresponding elements.

***Allowable Subject Matter***

Claims 6, 8, 10, 14, 19, 27, 29 and 30 are allowed over the prior art. The following is a statement of reasons for the indication of allowable subject matter: the applicant incorporated the allowable subject matter into an independent form along with the intervening claim limitations. The combination of limitations in the independent claims 6, 8, 10, 14, 19, 27 and 29 were not taught in the prior art and are patentable.

***(11) Response to Argument***

<u>Group I: Claims 17, 23, 31 & 38</u>

Before addressing the issues as disclosed by the appellant's brief, the examiner would like to emphasize that the appellant's invention and main argument in the whole appeal brief can be summarized in lines 3-11 on page 10 of appellant's brief. Appellants argue that after perusing the prior art, the references of Uz and Resnikoff do

not disclose, teach or suggest that “bits should be conserved from, for example, a highly complex image area for use in a ‘normal video’ portion which contains less complexity.” The examiner respectfully disagrees. Uz’s column 3, lines 25-27 discloses the frame encoding is preferred when a video scene contains “significant detail” because that is where bits need to be conserved for encoding those video images, especially when the “normal video portion” has a lot of complexity. But, in order to determine the amount of bits for conservation during the intra-frame coding process, intra-frame statistics must be gathered in Uz for computing the number of bits that should be conserved for encoding a frame, otherwise the intra-frame coding would not be achievable in Uz.

Then, Uz’s column 9, lines 4-43, discloses the obtainment of an “intra-activity” or the intra-frame statistic, a measure of an image’s activity or complexity or random noise level. Moreover, Uz discloses the calculation of an intra-bias of the image or the biased coding of macroblocks towards “inter-coding” or predictive coding, thus this “bias” is used to encode macroblocks towards predictive coding, as disclosed in col.9, lines 36-43. Thus, an encoding adjustment is done where the quantization step size is determined based on the visual content of the image block (ie. amount of random noise within a video frame). In addition, Uz’s figure 3 discloses that if a threshold is exceeded, then intercoding is used which thereby reduces the bit-rate and conserve bits used in encoding said macroblock. And column 16, lines 1-37 dislcoses the actual pictures or normal video portion contains distortion or random noise. Uz discloses that a cost function can be used for determining how many bits are needed for conservation in order to accurately and efficiently encode the image data, and for Uz to accomplish

this task, the intra-activity, the distortion or complexity is used as a factor for determining the necessary amount of bits. In other words, Uz discloses the preservation of more bits for the less noisy or less complex area (ie.normal video portion) of an image at the cost of the high complex image area (ie.random noise portion).

Thus, Uz discloses the concept of a frame containing a normal portion and a random noise portion. Moreover, Uz teaches that "bits should be conserved from, for example, a highly complex image area for use in a 'normal video' portion which contains less complexity."

Regarding lines 20-23 on page 12 of the appellant's arguments, the appellant asserts that Resnikoff does not disclose, teach or suggest a dynamic encode approach which prevents random noise macroblocks or blocks with random details within a frame from consuming all or most of the picture bits for that frame. The examiner respectfully disagrees. The reference of Resnikoff reinforces the concepts that are already outlined and discussed in Uz. As stated before in the previous rejection, Resnikoff teaches the determination of noise in frames as shown in figures 2-3, where the input image is subjected to the image transformer and note in fig.3, the original input image 72 is generated into four arrays of coefficients 74-77 where 74 is the LL set, the lower frequency information that is more important to human viewing or the normal video portion, and elements 75-77 (LH, HL and HH set of coefficients), the less important video information or the random noise portions elements 75-77, are allocated by zero bits, thus preserving more bits for the LL set element 74 or the normal video portion;

clearly, the noisy portion of a frame is determined and that frames are comprised of macroblocks. Therefore, it would have been obvious to one of ordinary skill in the art to combine the teachings of Uz and Resnikoff for noise reduction and adaptive encoding so as to provide accurate, efficient encoding schemes for producing high quality images.

In summary, Uz and Resnikoff teach the limitations as disclosed in the appellant's claims 17, 23, 31 and 38. Uz and Resnikoff are useable and combinable together because they pertain to the same image processing environment. Thus, the limitations of the claims are met.

Group II: Claims 1, 2, 9, 21, 24, 25 & 27

Regarding lines 20-21 on page 13 of appellant's arguments, appellant argues that Uz does not disclose the saving of bits for the normal video portion at the expense of the random noise portion and that there is no encoding adjustment is done. The examiner respectfully disagrees. Please see the above paragraphs since these issues have already been addressed in the above paragraphs of the examiner's answer. See Uz's col.3, lines 25-27 and note intra-frame encoding is used and note Uz discloses "significant detail" is determined in a video frame, thus statistics are gathered from the intra-frame encoding process where also, the frame has the normal video portion along with the portion with significant detail, ie. random noise portion. Also see Uz's column 9. Also see Uz's column 16, lines 1-37, Uz discloses that actual pictures or normal video portion contains distortion or random noise.

Regarding lines 6-7 on page 14 of appellant's arguments, appellant argues that Uz makes no encoding adjustment and comparison of a macroblock activity level to a predefined threshold level. The examiner respectfully disagrees. Please see the above paragraphs since these issues have already been addressed in the above paragraphs of the examiner's answer. See Uz's figure 3 and note that if a threshold is exceeded, then intercoding is used which thereby reduces the bit-rate and conserve bits used in encoding said macroblock. Also see Uz's col.9, lines 4-12 and 36-43, and note that Uz does teach the biased coding of macroblocks towards "inter-coding" or predictive coding, thus this "bias" is used to encode macroblocks towards predictive coding.

In summary, Uz and Resnikoff teach the limitations as disclosed in the appellant's claims 1, 2, 9, 21, 24, 25 and 27. Uz and Resnikoff are useable and combinable together because they pertain to the same image processing environment. Thus, the limitations of the claims are met.

<u>Group III: Claims 3-5 & 26</u>

Regarding lines 21-24 on page 15 of appellant's arguments, appellant contends that Uz teaches away from both the use of information exclusively within the macroblock and the use of a value other than the minimum as an activity level for the macroblock. The examiner respectfully disagrees. Please see the above paragraphs since these issues have already been addressed in the above paragraphs of the examiner's answer. See Uz's figure 3 and note that if a threshold is exceeded, then intercoding is used which thereby reduces the bit-rate and conserve bits used in encoding said macroblock. Also see Uz's col.9, lines 4-12 and 36-43, and note that Uz does teach the

biased coding of macroblocks towards "inter-coding" or predictive coding, thus this "bias" is used to encode macroblocks towards predictive coding.

First, Uz does teach the use of information within the macroblock since a macroblock is comprised of pixels, as one of ordinary skilled would acknowledge. Second, applicant discloses that Uz always uses the minimum value calculated from blocks within and surrounding the macroblock as the value of the macroblock. Can Uz's system have a minimum value without the ordering of values (ie. without the prioritization of the block values)? It cannot have a minimum value. In other words, Uz must have the block values ordered or prioritized at some point so that one can determine the minimum value. Otherwise the minimum value would not be obtainable without the ordering of values. The values would be indistinguishable without order.

For the above reasons, the examiner submits that Uz discloses the limitations of claims 3-5 and 26.

<u>Group IV: Claims 7 & 28</u>

Regarding the bottom paragraph on page 16 of appellant's arguments, the dependent claims 7 and 28 are still believed to be rejected for the same reasons as discussed in the above paragraphs relative to Group II claims. The examiner has already addressed the issue of the macroblock within a random noise portion that is biased towards being predictive coded when the macroblock exceeds a predefined threshold. See Uz's figure 3 and note that if a threshold is exceeded, then intercoding is used which thereby reduces the bit-rate and conserve bits used in encoding said macroblock. Also see Uz's col.9, lines 4-12 and 36-43, and note that Uz does teach the

biased coding of macroblocks towards "inter-coding" or predictive coding, thus this "bias" is used to encode macroblocks towards predictive coding.

Group V: Claims 12, 13, 15, 16, 18, 20, 22 & 32-36

Regarding lines 13-14 on page 17 of appellant's arguments, appellant states that Uz does not teach or suggest the pre-encode complexity measurement. The examiner respectfully disagrees. Please see the above paragraphs since these issues have already been addressed in the above paragraphs of the examiner's answer. See Uz's col.3, lines 25-27 and note intra-frame encoding is used and note Uz discloses "significant detail" is determined in a video frame, thus statistics are gathered from the intra-frame encoding process. Also, see Uz's column 9. The intra-activity of a macroblock is the pre-encode complexity measurement because the intra-activity indicates the amount of "significant detail" or complexity in a macroblock, and in turn, this intra-activity is used for determining the amount of bits needed before encoding a frame.

The examiner contends that the limitations of claims 12, 13, 15, 16, 18, 20, 22 and 32-36 are rejected for the reasons as stated above.

Conclusion

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Allen Wong
Examiner
Art Unit 2613

AW
March 26, 2003

Conferees
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